PART D – Relevance of the Project

D.1 Why does the consortium undertake this project?

- *Which problem(s) will the project address in the participating Partner Countries? Why are these problems pressing?*
- *Please explain the result of the need analysis carried out for each Partner Country and for each Partner institution and provide qualitative and quantitative evidence for your results. Please refer also to studies carried out and feasibility analyses undertaken. In particular explain for each institution, why the support from the CBHE action is required. (limit 10.000 characters)*

The **primary objective** of the Latin-american Alliance for Capacity buildiNG in Advanced Physics (LA-CoNGA Physics) proposal is to modernize the educational platform in eight Latin-American higher education institutions (HEI) from four countries in the Andean region (Colombia, Ecuador, Peru, and Venezuela), using high-energy physics (HEP) as a model. The aimed modernization relies strongly on the development of an innovative e-learning platform based on low-cost open-access tools, installing connected instrumentation laboratories, a flexible problem-solving-oriented syllabus structured on modules for a one year master program and on the strengthening of cross-institutional relations among the target HEI's.

We propose to build capacity in the Andean region by teaching advanced physics during a one year master/specialisation and creating a Virtual Research and Learning Community (VRLC), complemented by training opportunities at 3 leading European research centers, start-ups and technology companies in the Andes and Europe and support to career development from the US. We leverage existing networks in international and regional HEP research.

Why HEP? HEP is the science of understanding the smallest components of matter and the origin of the universe, looking for answers to the key questions of our age: the existence of new symmetries at high energy, the nature of dark matter, the existence of extra space dimensions; the origin of Ultra High Energy cosmic rays. Big, precise, impressive machines and detectors are needed to achieve the goals of HEP. They are based on breakthrough technologies with the potential to contribute to the future competitiveness in key areas like healthcare, big data, electronics, open-access collaborative tools, etc. and open solid ground for young innovative companies and entrepreneurs. The main research areas in HEP currently cover: data acquisition and big data analysis, simulation and modelling, electronics and particle detectors and accelerators technology.

Problem: HEI's in the Andean region already have a high level of talent and brilliant teachers. However they cannot compete with the opportunities of large research universities, which used latest digital education tools and are closely linked to hands-on experimental facilities and a network of companies, as found elsewhere.

Observations:
(1) HEP has created vast virtual networks over more than half a century. The giant experimental facilities in HEP are shared and used remotely (like DESY in Germany and CERN with its Large Hadron Collider, LHC, at the border between France and Switzerland), and researchers collaborate globally on theoretical problems. HEP has been at the forefront of leveraging technology to solve research problems.
(2) The partner countries HEIs have connection to HEP. Efforts in the target HEI's within the HEP field started in the early 2000s by joining large experimental collaborations at the LHC or other regional astroparticle collaborations as the Pierre Auger Observatory (PAO) and the Latin-American Giant Observatory (LAGO). The consolidation of these efforts has proven difficult given the fragmentation of the Latin-american scientific community, episodic funding and subcritical mass in HEP-trained human resources.

(3) In the past, voluntary crowdfunded efforts have been set up to have remote teaching of HEP in some of these HEI from researchers/professors at the beneficiary, i.e. the CEVALE2VE (Centro Virtual de Altos Estudios de Altas Energías in Spanish).

(4) In the current information age, higher education is becoming globally distributed and inseparable from actual research and development in enterprises and companies. VRLC have proven to be an effective scheme in HEIs due to their possibilities for multi-institutional participation, synchronous and asynchronous online engagement, decentralised student discussion, academic networking, and cost-effectiveness. This type of cooperative lecturing arrangements exposes students and academic staff to a variety of cutting-edge concepts and techniques that cannot be accessed from just using standard textbooks.

Opportunity: one can create a VRLC by leveraging networks which already exist (CEVALE2VE[1], LatAm-EU-CERN[2], RedCLARA[3]) and new, inexpensive, online teaching technology. LA-CoNGA proposes to create a VRLC for HEP. These new online teaching technology will be made available to the whole partner country HEIs community to be used in other fields too.

Studies carried out and feasibility analyses undertaken: Since 2014 we have carried out small scale studies and feasibility analyses through the VRLC CEVALE2VE. CEVALE2VE has officially included a 60 hour virtual course “Introduction to HEP” developed for master and Ph.D. students in several of the partner countries HEIs: UCV and USB in Venezuela, UIS and UAN in Colombia, and UNMSM in Peru. The outcomes are invaluable: since 2014 the course has had four editions with more than 70 students joining from institutions in these countries. Many of these students have continued to a career in HEP now. The main challenges this crowdfunded network have faced are related to the need for a dedicated e-learning platform, the fragile IT infrastructure and non reliable broadband connections in the Venezuelan institutions and the fact that this preliminary initiative has relied on the brave goodwill of individuals. We will build upon our experience obtained with this virtual course of CEVALE2VE and address these challenges in LA-CoNGA Physics.

Need analysis results: While each partner countries HEI has various specific requirements to be addressed, there are significant similarities in their main needs that have been identified in the process of preparing this proposal. As a general rule, none of the partner countries HEIs possess a sufficient infrastructure for implementing e-learning tools on their own. Therefore inhibits the possibility of offering this kind of training through VRLCs. On the other hand, even if all universities support the formulation of new, modern physics programmes, focused on modern techniques and the needs of the modern world (like it is the case of HEP), all the physics departments in the partner countries HEIs have few academic staff specialized in HEP, insufficient to develop a complete Master-level set of courses on their own, and therefore unable to create opportunities for student careers traditionally connected to fields as data science, advanced electronics and instrumentation, and global networking. This project intends to use existing scientific networks in the region and across Latin America and Europe to instead create a critical mass across the region.

Also, the physics education at all partner countries HEIs includes an undergraduate five years program, a two years master degree program and a Doctorate program. It has been recognized lately the necessity of a shorter, more flexible scheme to allow students to choose earlier their career options. There are ongoing discussions on how to modify the programs in the lines

[1] CEVALE2VE: http://www.cevale2ve.org/
[2] LatAm-EU-CERN: https://international-relations.web.cern.ch/stakeholder-relations/Associate-Non-Member-State-Relations
[3] RedCLARA https://www.redclara.net

suggested by European Union (UE)'s Bologna declaration, but there still have been no agreement on this direction. Experiences with successful flexible master programs like the one proposed by LA-CoNGA Physics may help to boost this transformation. Below a detailed description of the additional needs for each partner countries HEI is provided:

Other specific problems and needs identified at the level of the Partner Country, Colombia:
Partner institution [Universidad Industrial de Santander (UIS)]: The UIS master degree is more than 50 years old and has a syllabus focused on traditional teaching methods and traditional theoretical physics contents with minimal training in data analytics or scientific instrumentation. Optics and Condensed Matter had been the most critical areas of the School during these years, with no expertise in HEP. Recently, Cosmology, Relativistic, and High Energy Astrophysics have emerged as critical areas of research with a significant number of students. Notably, the participation in two international collaborations related to Cosmic Ray Astrophysics: the LAGO and the PAO has boosted our experience in instrumentation of particle detectors. This program, open the possibility to train our students in HEP and complement our experience building particle detectors.

Partner institution [Universidad Antonio Nariño (UAN)]: Although the UAN has been member of large HEP collaborations since 2007, in particular the ATLAS experiment at the LHC and is now also part of the DUNE neutrino experiment (to be built between Fermilab in Batavia and South Dakota in US), it is a young university with not a strong tradition in Physics. The lack of state of the art instrumentation and data analysis tools discourage students interested in working on HEP. LA-CoNGA Physics would serve as a bridge between the Master's programme at the UAN and the research groups working on particle physics experiments.

Other specific problems and needs identified at the level of the Partner Country, Venezuela
Partner institution [Universidad Simón Bolívar (USB) and Universidad Central de Venezuela (UCV)]: These two universities face similar challenges. In recent years due to the economic and humanitarian crisis in Venezuela, there has been a decline in the number of teachers and researchers in Venezuelan HEIs. Therefore, many areas of scientific and technological importance which experienced a fast development are not adequately covered in their programs. This is the case with HEP-related topics, particularly instrumentation in detection techniques and data analysis in particle physics, which will be covered by the activities of this project. The e-learning platform and remote interactive teaching as part of the VRLC will be important to mitigate the shortage of professors at the universities. Furthermore, in the last years, the infrastructure has deteriorated considerably for lack of both maintenance and renewal of facilities. The scarcity of funds also impedes to support students through international internships.

Other specific problems and needs identified at the level of the Partner Country, Ecuador:
Partner institution [Universidad Yachay Tech]: Yachay Tech is a very young University that projects itself as a Research University (first in Ecuador) with a Faculty 100% Ph.D. By construction, they have focused on Condensed Matter Physics both experimental and theoretical, but recently they have also incorporated into their faculty personnel researching General Relativity, Nuclear Physics, Cosmology, and Quantum Optics. They have mandatory courses in the undergraduate curriculum that concerns particle physics and field theory taught by instructors with little research experience in the field. In September 2019 they plan to have a Ph.D. program that will include particle physics and field theory as one of its research directions, and they will need cooperation of the VRLC of LA-CoNGA Physics to guarantee quality and access to experienced teachers.

Partner institution Universidad [Universidad San Francisco de Quito (USFQ)]: USFQ is the only non-governmental higher education institution in Ecuador which offers an undergraduate Physics career since 1992. In 2018 a Master degree program in Physics was officially approved by the Ecuadorian government and will start at the end of 2019. A major disadvantage that a non-governmental higher education institution as USFQ faces is the impossibility to have access to government funding to invest in new teaching technologies and teaching lab facilities.

Other specific problems and needs identified at the level of the Partner Country: [Peru]:
Partner institution [Universidad Nacional de Ingeniería (UNI)]: the physics education at UNI requires a renewal of some of the installations (lab and computer facilities) and teaching methods in order to provide a cutting-edge training. Many of the students prefer to pursue his career in other institutions inside or outside of Peru with a more modern system. Also, UNI is lacking resources for student and staff mobility. The staff of the graduate programs consists in 20 academics (4 of them with a PhD degree, specializing in HEP) and the number of students is 24 (3 master students and 2 PhD students in HEP).

Partner institution [Universidad Nacional Mayor de San Marcos (UNMSM)]: The UNMSM is one of the most important higher education institutions in the country and, together with UNI, is the public institution most significant in Physics both for research and education standards. The needs for UNMSM are very similar to those of UNI to a large extent. With the addition that it does not possess a master program specialized in HEP at all. The participation of the UNMSM in the CEVALE2VE courses created interest at the university level to implement new and open learning tools to give access to the students to courses of cutting-edge fields like HEP.

(*Please add Partner Countries/partners as appropriate)*

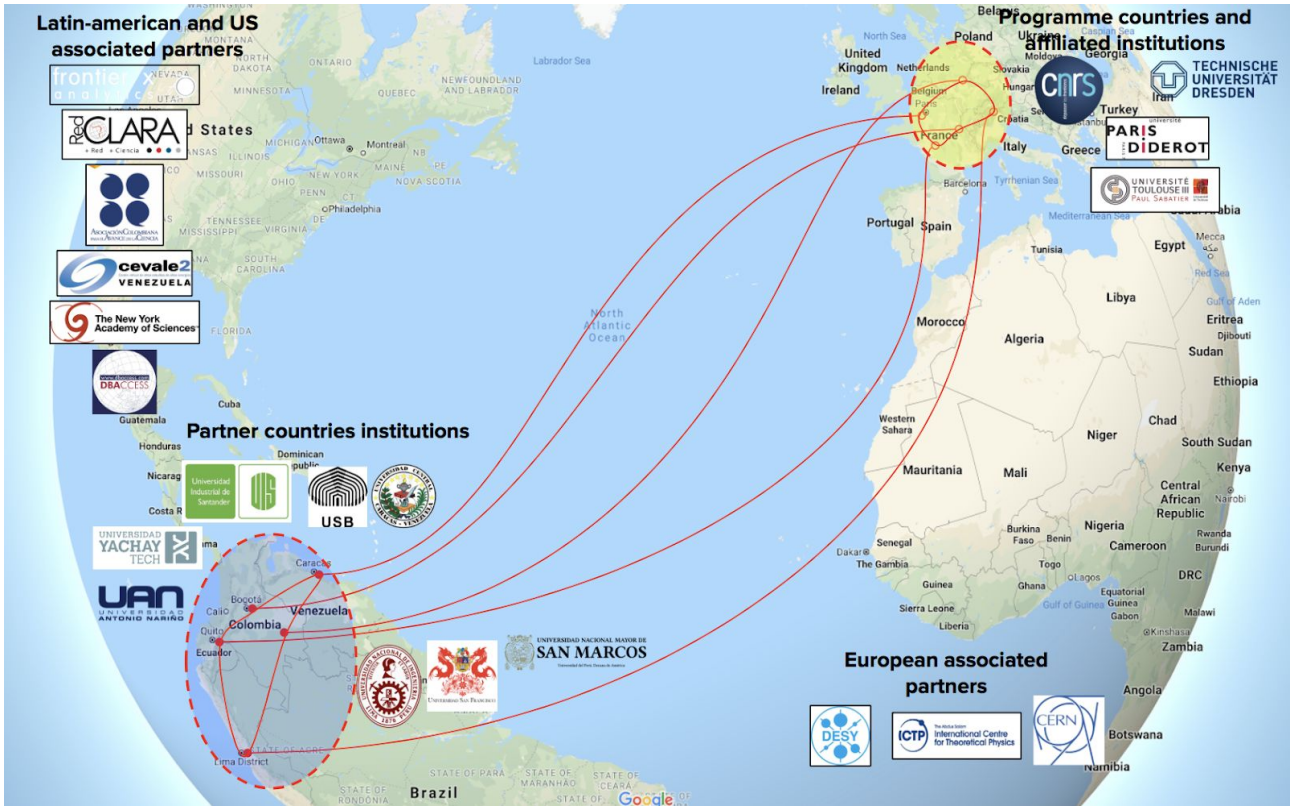

Figure 1. LA-CoNGA Physics network members

Please identify the target groups and their needs in each Partner Country and in each Partner Country institution. (limit 8.000 characters)

E.1 Project activities and methodology

Please provide a detailed description of the activities and the working methodology to be used for achieving the objectives (including major milestones, measurable indicators, etc.). (limit 6.000 characters)

The collaborative work of the 21 institutions participating in LA-CoNGA Physics will be structured in 6 work packages (WP): WP1 (Preparation), WP2 (Development and installation of tools), WP3 (Training and education), WP4 (quality plan), WP5 (Dissemination, awareness and exploitation) and WP6 (management). Each WP has, in turn, several activities (described in E.5 and E.6). Responsibilities for each work package is distributed among the partners taking into account their expertise.

WP1 (Preparation) deals with a more in-depth review (with respect to the preliminary needs survey performed for this proposal described in D.1) of existing teaching methods, curricula and instrumentation laboratories in the Partner Country HEIs in light of the latest *e*-learning technologies and the comparable programmes in the partnering Programme Country HEIs and others institutes. Methodologies used here are internet search, explorative open and closed questionnaire surveys, that will be subject to quantitative and qualitative analyses. The outcome of this work will be assessed by the External Advisory Committee and the revised curricula, teaching methods and equipment will be summarized in a report discussed and defined by the partners at a virtual project meeting at the end of M4. The measurable indicators for WP1 are related to the results of the discussion/decisions at the meetings, the surveys and desk study as well as the detailed report of the proposed curricula for the one-year master/specialization program, teaching methods and required equipment.

WP2 (Development and installation of tools) activities are based on the recommendations from the review in WP1. WP2 is designed to accomplish the following:

- Extend, integrate and implement the *e*-learning RedCLARA platform that will be used to gather the resources of the project, discussion forum for students/staffs. Production of documentation in English and Spanish and also video tutorials. Members of the team will be trained to use the platform by videoconference, how to adapt contents and formats and create new *e*-learning modules taking into account local settings and target group needs.
- Buying and installation of the required laboratory equipment in each Partner Country HEI between M4 and M9 using the Erasmus+ budget. The main ideas are diversification and cost optimization, each laboratory will focus in only one particle detection technique (Resistive Plate Chambers RPCs, Water Cherenkov Detectors WCDs, Scintillators, etc), students, teaching and technical staff will have remote access to the detection system and data will be stored in a central repository. A prototype testbench will be installed to allow students to develop, construct and test data acquisition modules.

It will start in M5 and continue up to M11. The measurable indicators for WP2 are the e-learning tool and laboratories themselves.

WP3 (Training and education) activities are based on the recommendations from the review in WP1. WP3 is designed to accomplish the following:

- Implementation of the master one year program including development of the e-learning mini-modules with content related to the theoretical side: quantum field theory, particle and statistical physics as well as cutting-edge instrumentation and data analysis. The master will also include:
    - Data challenges with data from CERN, PAO, LAGO installations. Non-academic data from industry associated partners will also be considered. These data challenges will require students to develop new algorithms or instruments to solve real problems.

- A mobility scheme between Latin-American countries and also with Europe with the support of our associated partners from academia and industry.
- A one week network-school (NS) will take place towards the end of the one-year master program where the students will have the opportunity of presenting their work but also we will have trainings specifically focused on CV, interviews and self-assessment, as well as specific trainings and keynote speeches highlighting their challenges and successes from the non-academic sector partners.

A first version of the master will take place between M12 and M21. This first one will help us gather information and learn what needs to be changed (new material, new teaching techniques) before the second version takes place between M24 and M33.

WP3 will start in M5 and continue up to M33. Training course series (to guide the staff training processes) as well as the master course materials will be made available via an online extranet. The measurable indicators for WP3 are the number of capacity building activities and mobility for both staff and students and these are closely monitored through learning agreements and compulsory feedback between sending/hosting institutions and the staff/students.

WP4 (Quality Plan) will comprise detailed activities of evaluation. In order to continuously improve the project and its outcomes during the project lifetime, a number of different evaluation measures will be undertaken (see E.6 for more details).

WP5 (Dissemination and Exploitation) is related to the dissemination of the results of the project and to its sustainability. In order to generate awareness and to widely disseminate project results to relevant target groups and stakeholders and thus meet the main objective, communication measures will be implemented via different channels: through the media, during our NSs, citizen science projects, publications. The measurable indicators are the developed strategy and the organized dissemination activities. Regarding sustainability, a feasibility study will be done to develop Double Master degrees, as well as the established long - term activities like outlines for future summer schools and a teacher alumni network. Associated partners will also collaborate in terms of dissemination of the results of the project using their contact networks.

WP6 (management) is related to the implementation of tools for the consortium partners to communicate efficiently, to provide clear and simple timelines and guidance on project reporting (internal and external), organize face-to-face meetings for the project partners to exchange ideas and work together on the set goals and keep the costs within the set budget. Measurable indicators for WP6 are the number of organized Board meetings and other type of meetings (e.g. task force meetings), the consortium communications and the reports and financial audits submitted according to the Work Plan in E.4

The LA-CoNGA Physics agenda is described in what follows. The training activities will start in the first month of the project with a **Kickoff Meeting (KM)** including all members of the External Advisory Committee (EAC), representatives from all Partners and Beneficiaries, aiming to (a) discuss the exact deliverable of all WP and their relation;(b) plan in details the first six months of work; and (c) finalise the Consortium Agreement and establish management structures. Activities of the network will be coordinated through **Annual General Meetings (AGM)**, which will serve four main purposes: (a) reporting of the results obtained in each WP; (b) knowledge transfer among participants; (d) knowledge sharing of the problems solved during the activities. The three AGMs will feature management meetings where the progress of scientific and other activities will be monitored. The first AGM will coincide with the mid-term meeting and the report to the EU. The second AGM will also design a **roadmap for the sustainability** of the research, educative and training infrastructure. The third AGM will be devoted to internal and external evaluation and the generation of a summary document.

Please demonstrate that the activities and the methodology mentioned are the most appropriate to achieve the envisaged results and that they are feasible. (limit 3.000 characters)

Through the creation of a VRLC all the partner HEIs will have granted access to highly qualified professors/trainers currently working in the program, partner and associated institutions. The Latin-american HEP community is currently too small to cooperate in order to create the 'talent pipeline' and start teaching this discipline. Without this project this won't be possible (not enough local resources, not enough structure) and by doing the project we can deliver on a long-term shared objective (growing the community).

The activities of this VRLC will rely on the use of information and communications technology (ICT) tools, an e-learning platform, because all the members will be in different countries. This type of technologies and teaching methods have been successfully used and reproduced in the past, e.g. the CEVALE2VE experience. This is also the most economic way to address the needs of the partner countries HEIs. LA-CoNGA Physics will train teachers and technical staff to use these ICT tools to ensure the sustainability of the activities of the VRLC.

On the other hand given the importance of digital skills and of integrating cutting edge technologies in higher education the virtual course that will be developed within the project will have a component related with instrumentation and a component related to data analytics and machine learning techniques. Hands-on activities are very important in this context and this is why the project will support local institutions in setting up small laboratories, instrumentation and computing resources aimed at providing practical experience to students.

Finally, the envisage results regarding internationalisation of the partners HEIs will be achieved by enabling a mobility program for students, including international travels for internships and network schools. Clearly, the internationalization will be established in two levels: from the intra-regional links among the HEIs in Latin America and with the European institutions. The structure of the curricula and the opportunities offered to students (e.g. instrumentation and IT practices at home and internship) will naturally mimic the structure used in EU universities where the participants to the projects work, which is a model that works. The working practices in EU in the field at the edge of research and education is what LA-CoNGA Physics will introduce as it will start HEP education bottom up from scratch - these practices have been very successful in making EU a HEP powerhouse (e.g. the students first do practices at home, then get sent to labs to do theses).

What concrete, tangible results are expected to be achieved at the end of the project's activities in each of the targeted Partner Countries? (limit 6.000 characters)

All the members of the LA-CoNGA Physics will be part of a VRLC and as such a common set of tangible results are expected at the end of the project. Below is the list of tangible results per WP leading to the specific objectives of the project is presented:

WP1: Preparation

- Report summarising the revised curricula, teaching methodologies and equipment needed in each partner country HEI for the development of the project.

WP2: Development and installation of tools

- e-learning platform for LA-CoNGA Physics: based on the tools that currently exist in the Colaboratorio by redCLARA and the CEVALE2VE projects. The tools, software and

Expected Deliverable/Results/ Outcomes	Work Package and Outcome ref.nr	**5.1.**	
	Title	Communication and Dissemination Plan	
	Type	☐ Teaching material ☐ Learning material ☐ Training material	☐ Event X Report ☐ Service/Product
	Description	Detailed dissemination strategy report identifying the target groups, offline/online media outlets as well as defining the external events where LA-CoNGA Physics project can be presented. The objectives of the Communication and Dissemination Plan will be transmitting our educational and scientific advancements to the general public, to high school students and teachers, to other students and communities at the university and to the educative authorities/policy makers at the institutional and national level for them to be fully involved in the cultural growth of society and the modernisation process this project will bring to the partner countries HEIs.	
	Due date	M4	
	Languages	English	
Target groups	☐ Teaching staff ☐ Students ☐ Trainees ☐ Administrative staff ☐ Technical staff ☐ Librarians X Other		
	If you selected 'Other', please identify these target groups. *(Max. 250 words)* The members of the consortium in the form of the Executive Board (EB) and the External Advisory Board (EAB)		
Dissemination level	☐ Department / Faculty ☐ Institution	☐ Local ☐ Regional	☐ National ☐ International

Expected Deliverable/Results/ Outcomes	Work Package and Outcome ref.nr	**5.2.**	
	Title	Sustainability Plan	
	Type	☐ Teaching material ☐ Learning material ☐ Training material	☐ Event X Report ☐ Service/Product
	Description	This report will summarise feasibility study to develop Double Master Degrees in HEP between the consortium partners, targeting the HEI staff and administration. This work is conducted via establishing working groups for bilateral Double Master degree schemes between the partners and developing proposals for Double Master Degrees. Secondly, it will summarise identified long - term actions to promote and maintain the collaboration between the partners including outlines for future summer schools and a teacher alumni network. The sustainability actions will be discussed in AGM3 with the consortium members and relevant external stakeholders at M36.	
	Due date	M36	
	Languages	English	
Target groups	☐ Teaching staff ☐ Students ☐ Trainees ☐ Administrative staff		

	☐ Technical staff ☐ Librarians X Other		
	If you selected 'Other', please identify these target groups. *(Max. 250 words)* The members of the consortium in the form of the Executive Board (EB) and the External Advisory Board (EAB)		
Dissemination level	☐ Department / Faculty ☐ Institution	☐ Local ☐ Regional	☐ National ☐ International

Expected Deliverable/Results/ Outcomes	Work Package and Outcome ref.nr	**5.3.**	
	Title	Data Management and Protection Plan	
	Type	☐ Teaching material ☐ Learning material ☐ Training material	☐ Event X Report ☐ Service/Product
	Description	LA-CoNGA Physics will produce data from the instrumentation labs that will be shared among the different partners. Their treatment will follow a Data Management and Protection Plan (DMPP) compiled and signed by all Members in the first year. It will comply with Horizon 2020 FAIR (Findable, Accessible, Interoperable and Reusable) guidelines, maximise Open Access policies and will identify the LA-CoNGA Physics GitHub asreference location for access and preservation, with possible exceptions due to dataset size. Security and privacy aspects will be carefully faced. Collaboration will be sought with agencies promoting Open Access, e.g. CERN Open Data.	
	Due date	M10	
	Languages	English	
Target groups	☐ Teaching staff ☐ Students ☐ Trainees ☐ Administrative staff ☐ Technical staff ☐ Librarians X Other		
	If you selected 'Other', please identify these target groups. *(Max. 250 words)* The members of the consortium in the form of the Executive Board (EB) and the External Advisory Board (EAB)		
Dissemination level	X Department / Faculty X Institution	☐ Local ☐ Regional	☐ National ☐ International

Please copy and paste tables as necessary.

Expected Deliverable/Results/ Outcomes	Work Package and Outcome ref.nr	**5.4.**	
	Title	LA-CoNGA Physics Social identities on blogging platforms, instagram, facebook, twitter, pinterest, website	
	Type	☐ Teaching material ☐ Learning material ☐ Training material	☐ Event ☐ Report X Service/Product
	Description	Setup official LA-CoNGA Physics website, blogging and social media identities	

	Due date	M1
	Languages	English and Spanish
Target groups	X Teaching staff X Students ☐ Trainees X Administrative staff X Technical staff ☐ Librarians X Other	
	If you selected 'Other', please identify these target groups. *(Max. 250 words)* The members of the consortium and the general public	
Dissemination level	X Department / Faculty X Institution	X Local X Regional X National X International

Expected Deliverable/Results/ Outcomes	Work Package and Outcome ref.nr	**5.5.**	
	Title	Outreach activities and citizen science projects	
	Type	☐ Teaching material ☐ Learning material ☐ Training material	X Event ☐ Report ☐ Service/Product
	Description	Direct engagement with the different target groups can happen through different activities: General public, policy makers and other communities at the university will be reached through newsletters prepared for social media on our results and gatherings (blogs, instagram, facebook, twitter, pinterest), by participating in existing events (e.g. local Institute Open Days, the International Science Week in Colombia, etc), by producing press releases for newspapers and popular science magazines, by contributing to the Wikipedia content. We will organise outreach activities in our events, including specific activities targeting girls, public debates with people from other fields to discuss the impact of using *e*-learning techniques in the learning process. ● School students and teachers will be reached with conferences and keynotes in HEP, instrumentation and data analysis to inspire younger generations to follow their path, for which a database of material will be made available in our website. We will participate in the International Physics Masterclasses[1] and develop citizen science projects for them. ● We recognise the importance of addressing policy makers, to communicate them the relevance of modern techniques in the education systems, the important of fundamental research, the need of international support for multidisciplinary initiatives, and the importance of a tight connection with the industry, also to bring there the abundance of untapped potential of academics specialist knowledge, experience and propensity for hard work. Students, teaching, technical staff and in general members of the consortium should participate in at least one outreach activity per year. All the outreach material will be hosted in the public section of our website. The communication impact will be measured through social media reactions, website access counting, feedback on specific events through questionnaires.	

[1] International Masterclasses hands-on particle physics: https://physicsmasterclasses.org/

	Due date	M5-M36
	Languages	English and Spanish
Target groups	X Teaching staff X Students ☐ Trainees ☐ Administrative staff X Technical staff ☐ Librarians ☐ Other	
	If you selected 'Other', please identify these target groups. *(Max. 250 words)* The members of the consortium and the general public	
Dissemination level	X Department / Faculty X Institution	X Local X Regional X National X International

Expected Deliverable/Results/ Outcomes	Work Package and Outcome ref.nr	**5.6.**	
	Title	Data challenges	
	Type	☐ Teaching material ☐ Learning material ☐ Training material	☐ Event X Report ☐ Service/Product
	Description	Data challenges are small competitions that will require students to develop new algorithms to solve real problems, either proposed by some of them or by our non academic Partners (e.g. FrontierX). They will happen on the RAMP platform[2] that will automatically rank them. The algorithms will be presented by students during the NSs and summarised in one publication. These data challenges to other members at the university too.	
	Due date	M16, M19, M28, M31	
	Languages	English	
Target groups	X Teaching staff X Students ☐ Trainees ☐ Administrative staff X Technical staff ☐ Librarians ☐ Other		
	If you selected 'Other', please identify these target groups. *(Max. 250 words)*		
Dissemination level	X Department / Faculty X Institution	X Local X Regional	X National X International

Work package type and ref.nr	**MANAGEMENT**	**6**
Title	Management	
Related assumptions and risks	**R6.1:** Partners not signing the consortium agreement. **R6.2:** Partners not complying with planned targets resulting in lower performances, less reliable parts. **R6.3:** Partners may not deliver input in time resulting in failure to meet the deadline.	
Description	Coordinate and manage all activities and financial aspects of LA-CoNGA Physics, interaction with EB and EAB for all matters related to the network, continuously monitor	

[2] Rapid Analytics and Model Prototyping: https://www.ramp.studio/

G.2 Dissemination and exploitation strategy

Please explain how the dissemination will be organised during and after the project's lifetime. Define each target group and what communication channels will be used to reach them and when.

Target Group	Means of Communication to Reach These Target Groups	When	Indicators to measure the effectiveness of the means of communication
University students	Online and recorded classes, other videos (tutorials, seminars), documentation in the e-learning. Dedicated seminars in their respective institutions. Local printed and social media.	During all the duration of the project and after, thought the permanent master program that will remain in each of the institutions.	Because most of the students in the program will be formal students, we will have official records of their participation, rates of success and development during and after the master program. Metrics in the number of visits, bound rates, views and download of the resources.
High Schools students	Public and dedicated seminars and events where students are invited to the university institutions, or local visits. Similar to what is done by the well known IPPOG Masterclasses	During all the duration of the project and after, thought periodic seminars and annuals sciences and outreach events.	We will perform a review of the number of assistants to those events. Keeping contact with their teachers to know the number of students.
Professors and trainers	Seminars and specific courses for the current local personnel and prospects of people to join. Or those who want to replicate similar efforts. Local printed and social media.	During all the duration of the project and after, thought the permanent training process to get personal. And annuals sciences and outreach events.	Similar to the students enrolled in the masters, the training and seminars will be in a formal context. Keeping a record and follow-ups of the assistants
General public	Public seminars, dedicated conferences in public events and press articles in online and printed publications. Local printed and social media.	During all the duration of the project and after, thought periodic seminars and annuals sciences and outreach events. Periodic Social Media engage posts and discussions.	In many cases, the metrics is the number of visits, bound rates, views and download of the resources in the online media and networks.

Policy-makers and organisations	Dedicated seminars and meetings to refer subjects like ”Research-driven education” and “VRLC at the universities” models and their impact in the current and future economics.	During all the duration of the project and after, thought periodic and private seminars and annuals sciences and outreach events.	Looking at the commitments and agreements reached with them or by them. Possible joint declarations to public media.
Other universities and institutions in the region	Online coverage of the program. Invitation to other institutions to local and remote events to learn more about the opportunities and ideas.	Periodic sciences and outreach events. Dedicated conferences to participate as presenters.	Follow-ups with those colleagues and partners in the institutions. Possible enrolments or other forms of students' engage.
Specialised scientific and educators communities	Reviewed papers, conferences' presentations, proceedings. Seminars in Scientific installations like the partners CERN & ICTP	Periodic scientific events. Dedicated journals. Annual related events.	-Feedback obtained in-site. in the number of downloads and conversations in the online platforms where the content is shared (like ORCID)

G.3 Sustainability

Explain how exploitation activities will ensure optimal use of the results within the project's lifetime and afterwards. Explain how the impact of the project will be sustained beyond its lifetime. Please list the outcomes that you consider sustainable and describe the strategy to ensure their long lasting use beyond the project's lifetime. Also explain how the results will be mainstreamed and multiplied at national/regional level. Describe the strategy foreseen to attract co-funding and other forms of non-EU support for the project.

Sustainable Outcomes	**Strategy to ensure their sustainability**	**Resources necessary to achieve this**	**Where will these resources be obtained?**
trainings for e-learnings	Produce high-quality training documents, transfer knowledge to new technicians and staff	This will be partly funded through LA-CoNGA Physics. Additional maintenance can be achieved with local funding.	Local funding (not very resource-demanding if starting from the LA-CoNGA Physics outputs)
Have the partner HEIs become officially involved in large HEP projects	Use the LA-CoNGA Physics network (in particular with colleagues at CERN, DESY, IN2P3, IRFU,	Additional sustainability can be achieved by maintaining the activities of the	Local funding (not very resource-intensive if starting from the

	TUD, ICTP) to prepare contacts with the large HEP collaborations	network after the 3-year funding period.	LA-CoNGA Physics outputs)
Have other fields use the e-learnings and build their own VRLCs	Invite colleagues from other fields to observe and discuss the added value of the LA-CoNGA Physics VRLC	Not resource-demanding (to be done locally within each HEI)	Not resource-demanding (to be done locally within each HEI)
have other HEIs in Latin America (not in this project) use our VRLC approach	Use network schools and other conferences to establish contact with new colleagues	Mobility grants to invite colleagues, to attend conferences in other institutes.	Depending on the specific context of each partner HEI, budget for attending conferences can be either inexistent or limited.